CLAIMS

1. A composition for modifying an amount of charges on a surface of a target particle in a sample and separating or quantitatively determining the target particle in the sample, based on the modified surface charge amount, the composition comprising a charge control agent having a positive or negative charge in a solution and being capable of specifically binding to the target particle.

2. The composition according to claim 1, wherein the charge control agent specifically binds to a biological functional substance selected from a group consisting of an organic polymer, a protein, sugar, lipid, and nucleic acid, which are present on the surface of the target particle.

3. The composition according to claim 1, wherein the charge control agent comprises a group selected from a group consisting of a carboxylic acid group, a phosphate group, a sulfonic group, a phenol group, an alcohol group, a tertiary amino group, and a quaternary amino group.

4. The composition according to claim 2, wherein the charge control agent comprises a protein, a peptide, or nucleic acid, which is capable of specifically binding to the target particle.

5. The composition according to claim 4, wherein the nucleic acid is an aptamer or a functional equivalent thereof.

6. The composition according to claim 4, wherein the charge control agent further comprises a marker having a positive or negative charge in a solution.

7. The composition according to claim 6, wherein the charge control agent is a complex composed of an antibody or a functional equivalent thereof, which is capable of specifically binding to the biological functional substance, and the marker bound thereto.

8. The composition according to claim 6, wherein the charge control agent is a complex composed of a ligand for a receptor present on the surface of the target particle or a functional equivalent thereof and the marker bound thereto.

9. The composition according to claim 8, wherein the ligand is a peptide hormone, a growth factor, cytokine, or catecholamine.

10. The composition according to claim 6, wherein the charge control agent is a complex composed of an aptamer or a functional equivalent thereof and the marker bound thereto.

11. The composition according to claim 6, wherein the marker is a dyeing marker, a gold colloid, or latex.

12. The composition according to claim 11, wherein the dyeing marker is aminoethyl4-azidebenzamide trisodium salt or N-(3-triethlyammoniumpropyl)-4-(4-(dioctadecylamino) styryl) pyridiniumdi-4-chlorobenzenesulfonate.

13. The composition according to claim 1, wherein the charge control agent is reversibly bound to the target particle.

14. The composition according to claim 1, wherein the charge control agent is specifically bound to the target particle by an ionic bond or a hydrogen bond.

15. The composition according to claim 1, wherein the target particle is a cell selected from a group consisting of a white blood cell, a lymphocyte, a platelet, and a red blood cell.

16. The composition according to claim 15, wherein the lymphocyte is a T cell, a B cell, or an NK cell.

17. The composition according to claim 16, which is used for testing an immune function of a subject.

18. The composition according to claim 16, which is used for measuring a level of fatigue or stress of a subject.

19. The composition according to claim 16, which is used for determining whether or not a subject is infected with a virus.

20. The composition according to claim 1, wherein the target particle is a bacterium, a virus, or a fungus.

21. The composition according to claim 20, wherein the bacterium is selected from a group consisting of Escherichia coliform bacillus, salmonella, Yersinia enterocolitica, Vibrio parahaemolyticus, bacillus cereus, Campylobacter, Clostridium perfringens, and Staphylococcus aureus.

22. The composition according to claim 21, which is used for prevention and investigation of food poisoning.

23. A manufacturing method of a charge control agent used for modifying an amount of charges on a surface of a target particle in a sample and separating or quantitatively determining the target particle in the sample, based on the modified surface charge amount, the method comprising the step of:

binding a marker having a positive or negative charge in a solution to a protein, a peptide, or nucleic acid, or a functional

equivalent thereof, which is capable of specifically binding to the target particle.

24. The method according to claim 23, wherein the protein, the peptide, or the nucleic acid, or the functional equivalent thereof is specifically bound to a biological functional substance selected from a group consisting of an organic polymer, a protein, sugar, lipid, and nucleic acid, which are present on the surface of the target particle.

25. The method according to claim 24, wherein the protein is an antibody.

26. The method according to claim 24, wherein the nucleic acid is an aptamer.

27. The method according to claim 24, wherein the protein or the peptide is a ligand for a receptor present on the surface of the target particle.

28. The method according to claim 23, wherein the marker comprises a group selected from a group consisting of a carboxylic acid group, a phosphate group, a sulfonic group, a phenol group, an alcohol group, a tertiary amino group, and a quaternary amino group.

29. The method according to claim 23, wherein the marker is a dyeing marker, a gold colloid, or latex.

30. The method according to claim 29, wherein the dyeing marker is aminoethyl4-azidebenzamide trisodium salt or N-(3-triethlyammoniumpropyl)-4-(4-(dioctadecylamino) styryl) pyridiniumdi-4-chlorobenzenesulfonate.

31. The method according to claim 23, wherein the target particle is a cell selected from a group consisting of a white blood cell, a lymphocyte, a platelet, and a red blood cell.

32. The method according to claim 23, wherein the target particle is a bacterium, a virus, or a fungus.

33. The method according to claim 23, wherein a ratio or an amount of the marker to be bound to the protein, the peptide, or the nucleic acid, or the functional equivalent thereof is adjustable.

34. A method of separating or quantitatively determining a target particle in a sample, comprising the steps of:

mixing a sample containing the target particle and a charge control agent specifically binding to the target particle and

having a positive or negative charge in the sample, and binding the charge control agent to the target particle; and

separating or quantitatively determining the target particle provided with the charge control agent bound thereto, based on a surface charge modified by the binding of the charge control agent, by applying a voltage or current to the sample resulting from the mixing.

35. The method according to claim 34, wherein the mixing step is separately performed for a plurality of types of particles.

36. The method according to claim 34, wherein the mixing step is performed for mixing a plurality of types of particles with respective charge control agents which are different from each other.

37. The method according to claim 34, wherein the target particle is a cell selected from a group consisting of a white blood cell, a lymphocyte, a platelet, and a red blood cell, or a microorganism selected from a group consisting of a bacterium, a virus, and a fungus.

38. The method according to claim 37, wherein the charge control agent is bound to a biological functional substance selected from a group consisting of an organic polymer, a protein,

sugar, lipid, and nucleic acid, which are present on the surface of the target particle.

39. The method according to claim 38, wherein the charge control agent comprises a protein, a peptide, or nucleic acid, which is capable of specifically binding to the target particle.

40. The method according to claim 39, wherein the nucleic acid is an aptamer or a functional equivalent thereof.

41. The method according to claim 39, wherein the charge control agent further comprises a marker having a positive or negative charge in a solution.

42. The method according to claim 41, wherein the charge control agent is a complex composed of an antibody or a functional equivalent thereof, which is capable of specifically binding to the biological functional substance, and the marker bound thereto.

43. The method according to claim 41, wherein the charge control agent is a complex composed of a ligand for a receptor present on the surface of the target particle or a functional equivalent thereof and the marker bound thereto.

44. The method according to claim 43, wherein the ligand

is a peptide hormone, a growth factor, cytokine, or catecholamine.

45. The method according to claim 41, wherein the charge control agent is a complex composed of an aptamer or a functional equivalent thereof and the marker bound thereto.

46. The method according to claim 41, wherein the marker is a dyeing marker, a gold colloid, or latex.

47. The method according to claim 46, wherein the dyeing marker is aminoethyl4-azidebenzamide trisodium salt or N-(3-triethlyammoniumpropyl)-4-(4-(dioctadecylamino) styryl) pyridiniumdi-4-chlorobenzenesulfonate.

48. An instrument for separating or quantitatively determining a target particle in a sample, comprising:

mixing means for mixing a sample containing the target particle and a charge control agent specifically binding to the target particle and having a positive or negative charge in the sample, and binding the charge control agent to the target particle; and

separation/quantitative determination means for separating or quantitatively determining the target particle provided with the charge control agent bound thereto, based on a surface charge modified by the binding of the charge control agent, by applying

a voltage or current to the sample resulting from the mixing.

49. The instrument according to claim 48, further comprising a plurality of injection means for separately injecting the sample containing the target particle and the charge control agent.

50. The instrument according to claim 48, wherein the target particle is a cell selected from a group consisting of a white blood cell, a lymphocyte, a platelet, and a red blood cell, or a microorganism selected from a group consisting of a bacterium, a virus, and a fungus.

51. The instrument according to claim 50, wherein the charge control agent is bound to a biological functional substance selected from a group consisting of an organic polymer, a protein, sugar, lipid, and nucleic acid, which are present on the surface of the target particle.

52. The instrument according to claim 51, wherein the charge control agent comprises a protein, a peptide, or nucleic acid, which is capable of specifically binding to the target particle.

53. The instrument according to claim 52, wherein the nucleic acid is an aptamer or a functional equivalent thereof.

54. The instrument according to claim 52, wherein the charge control agent further comprises a marker having a positive or negative charge in a solution.

55. The instrument according to claim 54, wherein the charge control agent is a complex composed of an antibody or a functional equivalent thereof, which is capable of specifically binding to the biological functional substance, and the marker bound thereto.

56. The instrument according to claim 54, wherein the charge control agent is a complex composed of a ligand for a receptor present on the surface of the target particle or a functional equivalent thereof and the marker bound thereto.

57. The instrument according to claim 56, wherein the ligand is a peptide hormone, a growth factor, cytokine, or catecholamine.

58. The instrument according to claim 54, wherein the charge control agent is a complex composed of an aptamer or a functional equivalent thereof and the marker bound thereto.

59. The instrument according to claim 54, wherein the marker is a dyeing marker, a gold colloid, or latex.

60. The instrument according to claim 59, wherein the dyeing

marker is aminoethyl4-azidebenzamide trisodium salt or N-(3-triethlyammoniumpropyl)-4-(4-(dioctadecylamino) styryl) pyridiniumdi-4-chlorobenzenesulfonate.